AWOC Microclimate Exercise: Gap Winds in Southeast Wyoming

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Overview

The mountainous terrain over portions of the Cheyenne, Wyoming, forecast area is particularly prone to the development of strong gap winds during the winter season, or generally between the months of October and May of any given year. The most notable locations include Arlington, which lies near Interstate 80 on the north side of the Snowy mountain range in south central Wyoming; and Bordeaux, which is located near Interstate 25 just east of the central Laramie mountain range in southeast Wyoming. The enhancement to wind flow occurs when westerly winds are forced eastward through narrow gaps in the aforementioned mountain ranges, often resulting in hazardous wind gusts in excess of 60 miles per hour. A strong surface pressure gradient and low-level instability are necessary for severe gap winds in the Arlington and Bordeaux areas. This can often occur behind cold fronts, or in association with mid and upper tropospheric waves.

Impact

As was previously mentioned, these strong winds occur most frequently during the cool season, but can occur at any time of the year. Arlington and Bordeaux both lie along the United States Interstate system, and are often the sites of blow overs of high profile vehicles such as tractor trailers. It is not uncommon for portions of either Interstate 80 or Interstate 25 to become closed or restricted due to high winds in southeast Wyoming.

Rules of Thumb

The most efficient gap flow occurs when a significant pressure gradient exists across (perpendicular to) a mesoscale gap in terrain, and can be enhanced by low-level instability. Westerly winds in excess of 50 knots at 700 millibars are typically a good indication of the potential for strong gap flow.

Models

As long as synoptic scale forecasts are realistic, high resolution models are useful tools for predicting gap winds at Arlington and Bordeaux. All available model guidance, including the GFS, NAM, and ECMWF, will typically provide clues for strong winds in these areas.